PB90-261645

Diazinon - Position Document 4. Intent to Cancel Registrations of Denial of Applications for Registration of Pesticide Products Containing Diazinon; Conclusion of Special Review

(U.S.) Environmental Protection Agency, Washington, DC

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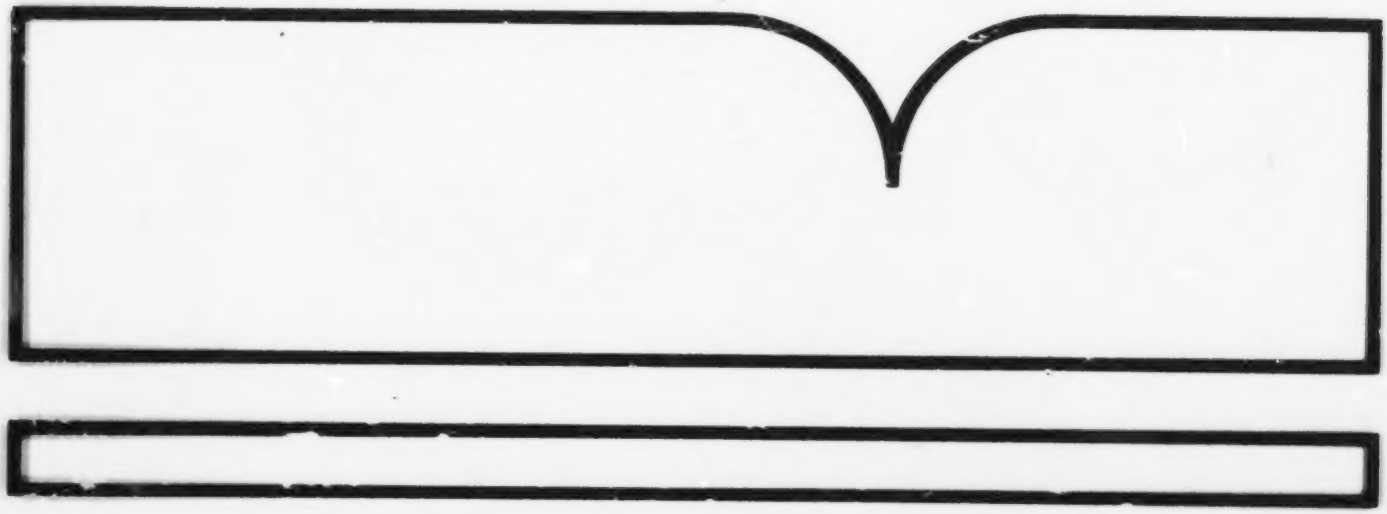

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16. Abstract (Limit: 200 words)

Diazinon is frequently used as a pesticide on golf courses and sod farms.

This Position Document addresses the risks and benefits of pesticide products containing the subject active ingredient. The Agency has determined that the use of products containing the subject active ingredient may meet or exceed a risk criterion described in 40 CFR Part 154. Potential hazards will be examined further to determine the nature and extent of the risk, and considering the benefits of the subject active ingredient, whether such risks cause unreasonable adverse effects on the environment.

17. Document Analysis a. Descriptors

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[OPP-30000/47A; (FRL-3088-4)]

Intent To Cancel Registrations of Denial of Applications for Registration of Pesticide Products Containing Diazinon; Conclusion of Special Review

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of Final Determination and Intent to Cancel.

SUMMARY: On January 6, 1986, EPA initiated a Special Review of all pesticide products that contain the active ingredient diazinon and that are registered for use on golf courses and sod farms. On the same date EPA also issued the Preliminary Determination proposing to cancel registrations and deny applications for use of diazinon products on these two sites. The initiation of the Special Review and the proposed cancellation action were based on the Agency's determination that the use of diazinon on golf courses and sod farms would result in unreasonable adverse effects on non-target birds. A Federal Register Notice was published concerning these actions on January 15, 1986 (51 FR 1842).

This Notice concludes the Special Review and announces EPA's final decision to cancel registrations and

deny applications of all pesticide products containing diazinon that are registered for use on golf courses and sod farms.

DATES: A request for a hearing by a registrant or applicant must be received by October 31, 1986, or 30 days from receipt by mail of this Notice, whichever is the later applicable deadline. A request for a hearing from any other adversely affected person must be received by October 31, 1986.

ADDRESS: Requests for a hearing must be submitted to: Hearing Clerk (A-110), Environmental Protection Agency, 401 M St., SW., Washington, D.C. 20460.

FOR FURTHER INFORMATION CONTACT:

By mail: Ingrid M. Sunzenauer, Special Review Branch, Registration Division (TS-767C), Office of Pesticide Programs, Environmental Protection Agency, 401 M St., SW., Washington, D.C. 20460.

Office location and telephone number: Rm. 1010, Crystal Mall Building #2, 1921 Jefferson Davis Highway, Arlington, VA. (703-557-7400).

SUPPLEMENTARY INFORMATION: This Notice is organized into six units. Unit I is the Introduction. It provides the background information concerning this cancellation action. Units II and III summarize the avian hazard and the benefits associated with the use of diazinon on golf courses and sod farms. Unit IV contains the comments of the Scientific Advisory Panel, the Secretary of Agriculture, and other public comments and EPA's response to those comments. Unit V describes the Agency's final determination, and the regulatory actions required by this Notice. Unit VI describes the procedures which will be followed in implementing the regulatory actions EPA is announcing in this Notice.

I. Introduction

A. Notice of Special Review and Preliminary Notice of Intent To Cancel

On January 15, 1986, a Federal Register Notice (51 FR 1842) was published concerning the Special Review of all pesticide products that contain the active ingredient diazinon and that are registered for use on golf courses and sod farms. The Notice announced (1) the initiation of the Special Review on these two sites, (2) the Preliminary Determination proposing to cancel registrations and deny applications for diazinon products used on these two sites, and (3) the availability of the Support Document. The Support Document (Ref. 17) contained the background information which supported the Agency's actions. This information included an assessment of the hazard to birds, the benefits of use on golf courses and sod farms, and a discussion of several regulatory options to reduce the hazard to birds. The Agency concluded that diazinon must be cancelled on these two sites to prevent unreasonable adverse effects on birds.

The Agency was also concerned about the avian and human hazards of diazinon and its major alternatives. A comparative avian hazard assessment indicated that the major alternatives are not likely to be of greater hazard to birds than diazinon.

The Agency also reviewed information concerning the potential human toxicity of diazinon and its alternatives. Based on the available data, the alternatives did not appear to pose a greater human health hazard than diazinon.

B. Legal Background

In order to obtain a registration for a pesticide under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended, an applicant for registration must demonstrate that the pesticide satisfies the statutory standard for registration, section 3(c)(5) of FIFRA. That standard requires, among other things, that the pesticide perform its intended function without causing "unreasonable adverse effects on the environment." The term "unreasonable adverse effects on the environment" is defined under FIFRA section 2(bb) as "any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide." This standard requires a finding that the benefits of the use of the pesticide exceed the risks of use, when the pesticide is used in compliance with the terms and conditions of registration or in accordance with widespread and commonly recognized practice.

The burden of proving that a pesticide satisfies the standard for registration rests on the proponents of registration and continues as long as the registration remains in effect. Under section 6 of FIFRA, the Administrator may cancel the registration of a pesticide or require modification of the terms and conditions of registration whenever it is determined that the pesticide appears to cause unreasonable adverse effects on the environment.

In determining whether the use of a pesticide poses risks which are greater than the benefits of use, EPA considers both possible changes to the terms and conditions of registration which can reduce risks, as well as the impacts of such modifications on the benefits of use. If EPA determines that such changes reduce risks to the level where the benefits outweigh the risks, it may require such changes be made in the terms and conditions of registration.

Alternatively, EPA may determine that no change in the terms and conditions of a registration will adequately ensure that use of the pesticide will not pose unreasonable adverse effects. In that event, the Administrator may issue a Notice of Intent to Cancel the registration or may hold a hearing to determine whether it should be cancelled under FIFRA section 6(b). In determining whether to issue such a Notice, the Administrator must take into account the impact of the action on production and prices of agricultural commodities, retail food prices, and otherwise on the agricultural economy. At least 60 days before formally issuing such a Notice, he must inform the Secretary of Agriculture in writing of the substance of the proposed actions and supply the Secretary with an analysis of the expected impact on the agricultural economy. At the same time, under FIFRA section 25(d), the Administrator is required to submit the proposal to the Scientific Advisory Panel for comment as to the impact on health and the environment of the action proposed in the cancellation notice. EPA is also required by law, where appropriate, to consult with the U.S. Department of the Interior's Office of Endangered Species to see if the proposed action may affect an endangered species.

EPA also informs the public of its proposals to issue cancellation notices so that registrants and other interested persons can also comment or provide relevant information before any final Notice of Intent to Cancel is issued. Registrants and other interested persons are invited to review the data upon which the proposal is based and to submit data and information to address whether EPA's initial determination of risk was in error. In addition to evidence relating to risk, comments may include evidence as to whether any economic, social, and environmental benefits of use of the pesticide outweigh the risks of use.

If, after reviewing the comments received, EPA decides to issue a Notice of Intent to Cancel, any adversely affected person may request a hearing to challenge the action. In the hearing, any party opposing cancellation would have an opportunity to present evidence to show that the registrations of the pesticide should be permitted to continue. Other interested parties could intervene to present evidence in favor of

cancellation. At the end of the hearing EPA would decide on the basis of the evidence presented whether or not to cancel or restrict the registration of pesticide products. If no hearing is requested, each registration would be cancelled by operation of law 30 days after receipt by the registrant or publication in the Federal Register of the Final Notice, whichever occurs later.

II. Summary of the Avian Hazard

In this unit the Agency provides a summary of the avian hazard associated with the use of diazinon on golf courses and sod farms. This includes information discussed in the Support Document, as well as information reviewed after the Notice of Special Review and Preliminary Notice of Intent to Cancel was issued.

A. Summary of the Avian Hazard Assessment in the Support Document

In the Support Document the Agency evaluated acute toxicity studies which indicated that diazinon is very highly toxic to birds. The laboratory measurements of toxicity which the Agency used to evaluate the acute hazard were the median lethal concentration ($_{50}$) and the median lethal dose ($_{50}$) which kill 50 percent of the test organisms.

To evaluate the acute hazard, the Agency estimated residue levels on grass and seed to determine if the levels would exceed the $_{50}$ for grazing and seed-eating birds. The Agency also estimated the dose of diazinon that waterfowl or seed-eating birds would consume from residues on grass and seed to determine if the values would exceed the $_{50}$. Both residue level and dose estimates exceeded the toxicity measures for certain species.

The Agency also evaluated the bird kills which had been reported to the Agency. Approximately 60 bird kills were reported in which diazinon was either confirmed or implicated as the primary cause. These kills involved 23 species of birds, including migratory and non-migratory waterfowl, songbirds, shore birds, wading birds, and others. Twenty of these kills occurred on golf courses and 20 kills on other grassy sites such as lawns, recreational areas, and parks. These incidents occurred during all months of the year and were documented throughout the country.

The Agency's concern for acute hazard to avian wildlife included a concern for impact on populations of species at risk. The Agency reviewed information which indicated that diazinon caused a reduction of a local population of Atlantic Brant Geese. On May 7, 1984, Diazinon AG500 was applied according to label directions to a golf course in New York. Approximately 700 Atlantic Brant Geese died. Carcass analysis revealed acute diazinon poisoning. The New York population of Atlantic Brant was estimated to be 2,500 in 1984. The Agency determined that this reduction was an impact of concern.

The Agency was also concerned about the effect of diazinon on endangered species. In October 1985, the Agency requested a formal consultation with the Office of Endangered Species, U.S. Department of the Interior. Results of this consultation had not been received when the Agency issued its preliminary determination. Details concerning the consultation are discussed in the Unit II.B below.

B. New Information Concerning the Avian Hazard

1. Endangered Species

In accordance with section 7 of the Endangered Species Act of 1973, the Agency requested a formal biological consultation of the Office of Endangered Species (OES), U.S. Department of the Interior in October 1985. The consultation concerned the registration of products that contain diazinon and that are registered for use on golf courses and sod farms.

OES responded on January 17, 1986 (Ref. 12), that certain endangered species could be seriously affected by the use of diazinon on these two sites. Two categories of impacts were presented. Category one was that diazinon "is likely to jeopardize," and category two was that diazinon "may affect, but will not jeopardize." The following two species are likely to be jeopardized by use of diazinon on certain golf courses and sod farms: (1) Hawaiian Goose *(Branta sandvicensis)* and (2) Mohave Tui Chub *(Gila bicolor mohavenis)*. The following species may be affected, but will not be jeopardized: (1) Brown Pelican *(Pelecanus occidentalis)*, (2) Alabama Beach Mouse *(Peromyscus polionotus ammobates)*, (3) San Francisco Garter Snake *(Thamnophis sirtalis tetrataenia)*, (4) Oregon Silverspot Butterfly *(Speyeria zerene hippolyta)*, and (5) June Sucker *(Chasmistes liorus)*.

It is the responsibility of the Agency to ensure that the use of diazinon is not likely to jeopardize the continued existence of any endangered species and to take steps to preserve and promote the recovery of endangered species. The cancellation of diazinon on golf courses and sod farms will ensure that diazinon does not jeopardize the listed species on the golf courses and sod farms identified by OES.

2. Residue Data

In the Support Document the Agency estimated diazinon residue levels on grass and seed. Reliable data on actual residues were not available at that time. During the public comment period, however, Ciba-Geigy Corporation submitted data (Ref. 2) concerning diazinon grass residues and effects of diazinon on Canada Geese penned on treated turf.

Diazinon was mixed with 35 gallons of water per acre and applied to grass at 2, 4, and 8 pounds active ingredient per acre (lb ai/A). Application was followed by irrigation with 0.25 inch of water. Thirty-five gallons are less water than recommended on the labels and would thus represent a worst case scenario. Canada Geese were then held in pens on the treated grass.

The Agency reviewed this study, found a portion of the residue data acceptable and conducted a statistical analysis of these data (Ref. 14). These data were not generated according to EPA's guidelines. For example, applications were not made according to label directions. However, some conclusions can validly be drawn.

In the study most of the samples of grass residues appeared to have been collected from the plots after the Canada Geese were released into them. The statistical analysis considers only those samples taken before the Geese were released into the plots. Interpretation of residues after the Geese had been grazing on the plots would not be reliable because the effect from the presence of the Geese is not known.

Using analysis of variance and t-tests, the Agency calculated the residues expected to result from application of 1 lb ai/A, followed immediately by irrigation with 0.25 inch of water. The 95 percent upper confidence limit, which represents the statistically significant highest expected residue in 95 percent of applications, is 53 parts per million (ppm).

If 1 lb ai/A results in 53 ppm, then 4 lb ai/A would be expected to result in 4 times 53 ppm or 212 ppm. Considering the residue of 212 ppm in combination with factors concerning avian ecology, behavior and physiology, the Agency concluded that birds foraging on treated turf would be exposed to lethal residues within a very short time. The Agency concluded that rate reduction to 4 lb ai/A would not adequately reduce diazinon residues.

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Ciba-Geigy, however, did not conduct a statistical analysis and provided only a mathematical summary of the data. The company concluded that with an application of 4 lb ai/A followed by 0.25 inch of water, residues were reduced and posed less of a hazard to birds. The Agency agrees that the residues are lower at 4 lb ai/A than at the present application rates for the major turf pests, but considers the residues still to be high enough to cause the death of foraging waterfowl.

The Ciba-Geigy data further indicate that irrigation, following application of diazinon, does not adequately reduce diazinon residues. Even if irrigation or rain could reduce residues on grass and seed, the Agency is still concerned about the formation of pools of contaminated water. If the water is not immediately absorbed by the soil, puddles with high concentrations of diazinon may form. As a result the birds may still be exposed to high diazinon residues.

3. Additional Bird Kill Reports

After the Federal Register Notice was published, the Agency received reports (Ref. 16) of 28 bird kills not mentioned in the Support Document. These reports included seven in California, eight in Washington, two in Connecticut, and nine in Canada.

The bird kills reported from California were all associated with use of diazinon in a State-administered program of Japanese beetle eradication. Experienced pesticide applicators applied diazinon, which was watered in immediately after application. Diazinon was applied to grassy areas such as lawns and pastures in suburban areas of Sacramento, California. State personnel warned residents to keep domestic fowl and pets away from treated areas. In some cases State employees assisted residents in building cages to keep domestic birds from wandering on to the treated grass and being exposed to diazinon for at least 24 hours following application. Despite these precautions domestic ducks and geese moved onto treated grass and were killed in two cases. In four additional cases wild birds, including magpies and robins, were killed. The California Bureau of Animal Health confirmed that diazinon caused all of these kills.

In another reported incident chickens were killed. The Bureau of Animal Health reported that the probable cause of the deaths was diazinon.

The State of Washington reported four separate incidents in which diazinon was either confirmed or strongly implicated as the cause or contributing factor of bird mortalities. The Washington State Department of Agriculture investigated one incident, and the U.S. Fish and Wildlife Service investigated the other three incidents.

The State of Washington also reported four other incidents of bird kills. These kills were attributed to diazinon, but not formally investigated. These cases were reported to the Agency because the State of Washington judged the reports to have been submitted by one or more credible sources.

All of the incidents reported by Washington involved grassy sites, including a golf course. In some cases label directions were followed, and in some cases the applications were made by certified pesticide applicators. Ducks, geese, and songbirds were involved.

The two bird kills in the State of Connecticut included residue analysis confirming diazinon as the cause of mortality. Brown-headed Cowbirds were killed on a baseball field and on a home yard. A commercial pest control company made the diazinon application to the home lawn.

Canada reported nine bird kills. These kills occurred in the province of British Columbia, which has waterfowl known to winter in grassy areas. One bird kill occurred on a home lawn and another in a park. Three other incidents were reported in which Canada Geese were killed from grazing on orchard grass in areas where diazinon had been applied to fruit trees. In four additional cases geese and ducks were diagnosed as killed by diazinon, but the site for each incident is still being investigated. British Columbia is the only Canadian province which has a toll-free number to report bird kills.

C. Conclusions Concerning the Avian Hazard

Based on the hazard assessment described in the Support Document and on the new information, the Agency concludes that the weight of the evidence demonstrates that substantial numbers of birds are exposed to lethal diazinon residues. This hazard is widespread and continuous throughout the country and throughout the year.

III. Summary of the Benefit Analysis

In this unit the Agency provides a summary of the benefits associated with the use of diazinon on golf courses and sod farms. This includes information discussed in the Support Document, as well as information reviewed after the Notice of Special Review and Preliminary Notice of Intent to Cancel was issued.

A. Summary of the Benefits Analysis in the Support Document

The benefits of diazinon on golf courses and sod farms were assessed in terms of the economic impacts which would result if diazinon were cancelled and users forced to use alternatives. The alternatives were chosen on the basis of cost and market availability. Because of the lack of data, the Agency assumed that diazinon and its alternatives were equally efficacious.

Agency estimates indicated that at least 512,000 and 60,000 pounds active ingredient of diazinon are used on golf courses and sod farms, respectively. The estimated impact of cancellation would be a cost increase of $937,200 for golf courses and $300,000 for sod farms. The Agency anticipated that these cost increases would not cause a severe impact when compared to the maintenance cost of $1,900,000,000 for golf courses or average impact of $0.07 per golfer and the gross revenue of $210,000,000 on sod farms.

B. New Information Concerning the Benefits

The Agency reviewed efficacy data from the Insecticide and Acaricide Tests (Refs. 11, 21, 22, 23, and 24) and from Ciba-Geigy Corporation (Refs. 1 and 2). Based on the Insecticide and Acaricide tests, the Agency determined that the major alternatives do not appear to be less efficacious than diazinon (Ref. 15), as indicated in the following table. The principal pests are in groups in which formulations and application rates for particular tests are comparable.

	Tests in which diazinon performed		
[illegible]	Better	Not significantly different	Worse
Bermudagrass	2	24	4
Canary	1	9	0
Chinchbugs	18	57	1
Isotomidae	3	125	4
Tricholaba	1	33	1

Ciba-Geigy submitted data comparing the efficacy of diazinon for application rates from 4 to 6 lb ai/A. The Agency evaluated these data and concluded that diazinon was as effective at 4 lb ai/A as 6 lb ai/A for certain pests (Ref. 15). The Agency has found, however, that lowering the application rate of diazinon from 6 lb ai/A to 4 lb ai/A does not adequately reduce the risk to avian species. The Agency discussed this regulatory option further in Unit IV.E of the Support Document and Unit IV.C of this Notice.

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C. Conclusions Concerning the Benefits

The impact of cancellation estimated in the Support Document did not change as a result of the new information. As a result of the new data, the Agency concludes that the major alternatives do not appear to be less efficacious than diazinon.

IV. Comments of the Scientific Advisory Panel, the Secretary of Agriculture, and the Public

The Agency transmitted the Support Document to the United States Department of Agriculture (USDA) and the Scientific Advisory Panel (SAP) for review and requested comment. The Agency also submitted additional information (Ref. 19) to the SAP. Unit IV.A and B contain the SAP and USDA comments and the Agency's response. The Agency also received public comments in response to the public comment period for the Federal Register Notice. These comments along with the Agency's response are summarized in Unit IV.C.

Copies of all comments, minutes of meetings with and correspondence among various interested parties, and unpublished documents referenced in this Special Review are contained in a docket maintained for this Special Review, as provided in EPA's Special Review regulations under 40 CFR Part 154, published in the Federal Register of November 27, 1985 (50 FR 49003).

The docket is available for public inspection from 8 a.m. to 4 p.m., Monday through Friday, excluding legal holidays in: Rm. 236, Crystal Mall #2, 1921 Jefferson Davis Highway, Arlington, VA.

The Agency notes that portions of the docket are considered Confidential Business Information and are not available for public inspection.

A. Comments of the Scientific Advisory Panel

EPA presented its proposed decision to the SAP in a public meeting held on May 21, 1986. On May 22 the Panel responded to EPA. The Panel's comments are reproduced in their entirety.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)—Scientific Advisory Panel

A Set of Scientific Issues Being Considered by the Agency in Connection With the Special Review of Diazinon

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Scientific Advisory Panel (SAP) has completed review of the data base supporting the Environmental Protection Agency's (EPA) preliminary determination proposing to cancel registrations and deny applications for diazinon products used on golf courses and sod farms. The review was conducted in an open meeting held in Washington, DC, on May 21, 1986. All Panel members were present for the review. In addition, Dr. Elwood Hill of the Patuxent Wildlife Research Center of the U.S. Fish and Wildlife Service served as an *ad hoc* member of the Panel.

Public notice of the meeting was published in the Federal Register on Friday, April 25, 1986.

Oral statements were received from staff of the EPA and from numerous members of the public and industry. The complete listing of the presenters is as follows: Dr. Darrell D. Sumner, Ciba-Geigy Corporation; Dr. Jeffrey Foran, National Wildlife Federation; Dr. Ward Stone, Department of Environmental Conservation for the State of New York; Mr. Gerald L. Faubel, Golf Course Superintendents Association of America; Mr. Chuck Pace, National Audubon Society; Ms. Diane Baxter, National Coalition Against the Misuse of Pesticides; and Dr. Norman W. Hummel, Jr., Department of Floriculture and Ornamental Horticulture at Cornell University.

In consideration of all matters brought out during the meeting and careful review of all documents presented by the Agency, the Panel unanimously submits the following report:

Report of SAP Recommendations

Diazinon

The Agency requested the Panel to focus its attention upon a set of issues relating to the pesticide diazinon. There follows a list of the issues and the Panel's response to the questions.

Panel response.—The Panel supports the Agency's preliminary determination to cancel diazinon uses on golf courses and sod farms to prevent unreasonable risks to avian populations. The strongest evidence in support of this action is the documentation of diazinon-caused bird kills at a number of sites over a number of years. But the Agency's position also is supported generally by a weight-of-evidence built upon laboratory toxicity studies, exposure analyses, and an understanding of avian physiology, behavior, and ecology.

Moreover, the Panel shares the Agency's concerns regarding risk of adverse impacts to birds that might be caused by other uses of diazinon such as home lawns, parks, etc. Thus, the current data call-in regarding risks of such uses is appropriate.

The Panel's responses to the Agency's specific questions are as follows.

1. The Agency specifically requests any comments that the Panel may wish to make with regard to the Agency's exposure analysis which considers measured residue data and avian foraging ecology, and the Agency's conclusion that use of diazinon on golf courses and sod farms at rates as low as 1 lb ai/A will result in lethal exposure to foraging birds.

Panel response.—The EPA was correct in intent to use both actual residues and avian foraging ecology to arrive at the conclusion that diazinon as presently applied will kill wild birds, but the data presented are not adequate to justify the conclusion that 1 lb ai/A is sufficient to kill. None of the data presented was adequate to permit such an extrapolation. However, 1 lb ai/A may be lethal to some birds simply because of the circumstances of the application, the attractiveness of the habitat to foraging birds, the ease of resultant exposure, and the acute sensitivity of birds to diazinon poisoning.

2. The Agency specifically requests any comments that the Panel may wish to make with regard to the Agency's preliminary decision that the number and size of bird kills attributed to diazinon demonstrate unacceptable risk to birds.

Panel response.—The Panel agreed. The true test has already been met in the historical demonstration of the problem through the array of avian die-offs under quite diverse sets of circumstances. Because of the diversity of circumstances and the vague factors contributing to the reported cases, it is reasonable to suggest that similar factors will kill some birds. It is likely that many similar instances have gone undetected. Thus, the risk is obvious and unacceptable if any value is placed on the resource. Further experimentation would certainly enhance our scientific understanding of factors that contribute to such kills, but the Panel does not believe that the kills can be eliminated simply by attempting to control the methods used for application. The attractiveness of the habitat and the sensitivity of birds to diazinon will continue to contribute to bird mortality.

It remains to be demonstrated whether alternative pesticides will be any less hazardous than diazinon. The EPA and registrants of such chemicals should be aware of the potential hazard associated with the use of alternative pesticides and initiate investigations to insure their safe use.

3. The Agency specifically requests any comments that the Panel may wish to make with regard to the Agency's analysis that the following regulatory options do not provide effective mitigation of unacceptable risk to birds:

(a) Continue registration without changes.

(b) Proposed label precautionary statement changes.

(c) Reduce application rate.

(d) Limit application to certain months.

(e) Limit application geographically.

(f) Require irrigation after application.

(g) Restrict use to certified pesticide applicators.

(h) Require more data prior to a regulatory decision.

(i) User education program.

Panel response.—Regarding other options proposed by the registrant and considered by the Agency for reducing risks (e.g., reducing application rates to 4 lb ai/A, restricting use to certified applicators), the Panel believes that such actions would reduce risks in some regions of the country and under some conditions. But the Panel concurs with the Agency's rejection of these alternatives, since there has not been sufficient evidence presented that would assure significant reduction of risks to avian populations. The burden of proof for support of these alternatives over that of cancellation should rest with the registrant, and, in the view of

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the Panel, insufficient evidence was presented to support a determination of environmental safety should these options be adopted. If the registrant is able to present scientific evidence, based on laboratory and field studies, to indicate that these alternatives for reducing risk would be effective, the registrant could apply for reregistration.

For the Chairman.

Certified as an accurate report of Findings.

Stephen L. Johnson,

Executive Secretary, FIFRA Scientific Advisory Panel.

Date: May 25, 1988.

The SAP's comments generally supported the Agency's conclusions concerning the avian hazard from diazinon application to golf courses and sod farms. The SAP made two points which were not in complete agreement with the Agency's conclusions.

First, the Panel commented that the available data were not adequate to permit extrapolation to 1 lb ai/A. However, the Panel did conclude that 1 lb ai/A may be lethal to birds because of the nature of the use sites and the acute sensitivity of some birds.

The Agency agrees that in some circumstances birds may be killed from application of 1 lb ai/A of diazinon.

Second, the Panel responded that the Agency did not adequately demonstrate the alternative pesticides to be less hazardous than diazinon.

The Agency responds that on the basis of laboratory testing, the alternatives appear to be almost as toxic to birds as diazinon. Residue estimates, however, indicated that the major alternatives are not likely to be of greater hazard. In addition bird kills associated with the use of the alternatives generally have not been reported. As a result the Agency still concludes that the alternatives are not likely to pose a greater hazard to birds than diazinon.

The Agency would also like to note that it is in the process of reevaluating its position concerning a Data Call-In Notice on home lawns, parks, and other sites through the reregistration process.

B. USDA's Comments

USDA's comments on the initiation of the Special Review of diazinon on golf courses and sod farms and the proposed cancellation are printed in full below:

Mr. Steven Schatzow, Director,
Office of Pesticide Programs, U.S. Environmental Protection Agency, (TS-766C), 401 M Street SW., Washington, DC 20460

Dear Mr. Schatzow: This is the U.S. Department of Agriculture's response to your letter of January 7, 1988 forwarding for comment the Agency's Position Document 1/2/3 for diazinon.

Our detailed comments are attached as an integral part of this letter. We therefore anticipate that they will also appear in the *Federal Register* together with the Agency's response.

As you will see from our comments, we believe that a cancellation of these two uses is premature at least and may be inappropriate. The attached information and perhaps additional research data should provide for the continued use of this valuable chemical.

We appreciate the agreement with Mr. P. Lapsley of your staff regarding our taking additional time to prepare our comments on this important issue.

Charles L. Smith,

Coordinator, Pesticides & Pesticide Assessment.

USDA Staff Comments on the EPA PD 1/2/3 for Diazinon

I. The large kill of Atlantic Brant Geese which gives the strongest support to a proposed Special Review by EPA may be the result of unusual circumstances.

A. A very strong argument is presented for cancellation of diazinon uses on golf courses and sod farms by using the large kill incident of Atlantic Brant geese. It is not pointed out, however, that the applicator responsible for that incident was later charged with a violation and forfeited a fine.

B. We have heard that several other insecticides were used at the sites where diazinon treatments were "confirmed or implicated" as the cause of bird kills. While EPA alludes to the presence of other insecticides, they do not attempt to identify them.

C. We also note that while it is common knowledge that golf course operators find the presence of large bird populations undesirable, the possibility of any deliberate misuse with the intent to reduce bird populations is not given consideration by the Agency. If misuse is occurring, the problem should be solved by enforcement, not cancellation.

D. The Executive Summary of PD 1/2/3 states on page (i) that "reduction of a local population of Atlantic Brant Geese" occurred as a result of applying Diazinon AG 500 according to label directions. We would suggest that improper application could have been a factor even if the applicator adhered to label directions. Proper use of irrigation as a means of washing down insecticide following application is largely discretionary and should be more clearly defined in label directions and educational programs. The practiced judgement of the applicator is critical in determining the quantity of water that should be applied, and explicit directions are mandatory.

II. Many years of successful use are weighty evidence that diazinon, when properly applied, is not a significant threat to birds.

A. One of the largest product uses of diazinon by itself or in combination with other insecticides has been as a seed-treatment. The seed for many thousands of acres of corn, peas, beans, sorghum, and soybeans have been treated prior to planting. Many of these treated seeds are consumed by seed foraging birds that successfully extract the planted seeds from the row or find them exposed on the soil surface. These seeds are a significant part of the diet of certain bird species during planting, and yet diazinon by itself and without extenuating factors has not been associated in bird kills. It would seem illogical that such kills would not be observed as these plantings are made nationwide. It must be concluded that barring misuse, or the unusual circumstance, diazinon is not a significant threat to birds.

B. Diazinon is a broad spectrum crop insecticide that has been used safely on alfalfa and clover with many years of experience. These forage crops are universally recognized as natural feeding and nesting sites for migratory birds and waterfowl. It is significant that there is no notation of any bird kills associated with these sites or with diazinon-treated forage grasses. Because these are highly visible pesticide use sites (especially in the Western flyways), it would logically follow that incidences of bird kills would be observed if they occurred. Additionally, these crop acreages are abundantly greater than those represented by golf courses and sod farms. We are not aware of possible EPA concern with rates, residues, timing, or toxicities on these sites. We therefore suggest that the proper application of diazinon on a crop does not by itself represent a hazard to birds.

C. We would point out that the Agency's concern that birds commonly confuse the diazinon granular formulations with grit is not valid. Diazinon granular formulations have numerous years of successful use as both soil-incorporated and surface applications on virtually all commercial and homeowner crop sites where broad spectrum pesticides are used and where birds commonly forage. Yet, diazinon has not been singled out as a pesticide that has contributed to bird kills from those aggregate uses.

III. Toxicological data, as well as associated information on the environmental fate of diazinon should be generated to more clearly define the potential hazards of use.

A. The PD states that irrigation practices are not relevant in bird kills and also states that while grass residues can be high and a source of toxicity without irrigation, excessive irrigation might result in surface puddling where birds may gather or drink and thus obtain lethal doses of insecticide. Additional research is needed on diazinon levels in water impoundments resulting from irrigation or precipitation. These impoundments or "traps" are commonplace on golf courses and are important habitats for waterfowl as well as drinking sites for other bird species. These data would be helpful in determining if acceptable application practices were followed with regard to uniformity of application, runoff, drift, or excessive application sites.

B. Further data are necessary regarding the presence of pesticide residues in bird tissues of dead birds. Allegations that several insecticides were used at sites where diazinon has been proposed as the causative

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agent in bird kills warrants further toxicological inquiry.

C. On page II–4 (last paragraph), it is indicated that there is lack of residue data on grasses. However, residue data should be available since diazinon is registered for use on pasture grass at similar label dosage rates and has a tolerance on those grasses of up to 60 ppm on fresh grass.

IV. The arbitrary indictment of sod farms as a hazardous use site may be capricious.

A. EPA concedes that no bird kills are attributed to diazinon application on sod farms. Still, they are included as a site for cancellation on the basis that sod farms are similar to golf courses. We would point out that sod farms are not necessarily similar to golf courses by nature of their prevalent subsoils, routine irrigation practices, or physical attributes of terrain. In fact, sod farms are noted for their common practice of overirrigation and obvious residual surface water (even after moderate rainfall). Yet, it is worth noting that bird kills have not been documented as being associated with these sites. These sites are commonly visible from public roads and highways and kills would surely have been reported.

V. There are outstanding benefits associated with properly administered pest control using diazinon.

A. The ARS Handbook No. 584, "Guidelines for the Control of Insect and Mite Pests of Food, Fibers, Feeds, Ornamentals, Livestock, and Households" lists 15 pests of lawn and turf areas which are not grazed. These would include turf farms and golf courses. Of these 15 pests, there are 14 for which diazinon is recommended for their control including the following: ants, armyworms, Bermudagrass mites (no other alternative recommended), billbugs, chinch bugs, cutworms, European chafer, green June beetle, Japanese beetle (larvae), grass scales, leafhoppers, fruit fly (no other alternative exists), mole crickets, and sod webworms. Dosages range from 1.8 to 6.8 lb ai/A. Most of the recommendations are for 5.4 lb ai/A because those pests which require the high rates for control are rare occurrences.

B. In addition to the phytophagous insects, there are several medically significant arthropods that are controlled by the use of diazinon applications to grasses and lawns. The brown dog tick is a vector of Rocky Mountain spotted fever and anaplasmosis. Diazinon is also registered for control of chiggers and fleas on lawns and turf. Control of these medically important pests and the benefits derived from their control, including their potential for vectoring diseases, should be taken into consideration in the Benefit Section of the EPA analysis.

VI. Clarification is needed with respect to speculation regarding the effects of population size, genetic variability, and survival of a species as a function of each.

A. On page II–20 of the document it is stated that local interbreeding populations of birds are considered "at least partially genetically distinct," that they provide "genetic variability," and enable the "national population" to avoid the threat of extinction. We suggest that the origin of local interbreeding and behavior unique to intraspecific populations (known as demes) need have no genetic basis (this is discussed in detail in "The Origin of Species" E. Mayr). While the unfortunate loss of members from a deme might influence the rate of gene migration within the associated genotypes, there is no reason to anticipate a change in the residual gene pool. Thus, aside from the view that large scale decimation might numerically threaten species survival, there is no sound basis to assume that genetic variability is a limiting factor until a species population is very small. It then becomes a matter of population dynamics as well.

VII. We have assessed cost projections as presented by the Agency and do not concur with estimates of increased costs to consumers. The basis for this position is explained below:

A. The maximum application rate for AG 500 is 4 oz/1000 square feet. When expanded, this rate does not exceed 5.57 lb ai/A (maximum).

B. Recognizing the detailed estimates of alternative preferences made on the basis of the 10 EPA Regions, there is no real basis for presuming that proportionate preferences for alternative insecticides will vary in any great degree from current use preferences. In other words, the equivalent acre treatments denied diazinon by cancellations would be assumed by the alternative insecticides according to weighted quantities of the current proportionately preferred market.

C. The weighted proportion of the diazinon relinquished market is then increased as follows:

Compound	Pounds of diazinon replaced
Isofenphos	183,338
Trichlorfon	107,031
Carbaryl	69,623
Chlorpyrifos	46,090
Bendiocarb (*)	
Others	107,031
Total	512,111

(*) Be—not even comparable to others.

D. When those weights are divided by the equivalent acre-treatment rates of diazinon, and then multiplied by the maximum acre treatments rates of alternatives, the numbers that represent the equivalent lbs active for the increased amounts of alternative products are obtained. Further multiplying those amounts by the costs of alternatives provided by the Agency (and including low estimated costs for "other" insecticides), the increased costs are projected as follows:

Compound	Pounds of diazinon replaced
Isofenphos	$1,833,350
Trichlorfon	97,300
Carbaryl	24,953
Chlorpyrifos	16,780
Others	194,601
Total	2,166,973

It is thus demonstrated that the costs exceed 2 million dollars. These calculations result in higher costs than presented by EPA regardless of formulation considered. This higher cost to the consumer cannot be effectively resolved by equating it to the annual fees of the individual golfer.

E. We have not attempted similar comparative justifications regarding quantities and costs with respect to sod farms but assume that similar results would be obtained.

VIII. Possible alternatives to cancellation may best serve the public interests.

A. EPA has considered the regulatory option of reducing the application rate but rejected it. Diazinon has been in use on golf courses for controlling turf pests and medically important arthropods for a long time. Considering the amount of diazinon used annually for these uses, the bird kills are too infrequent for diazinon to pose a substantial threat to wildlife. Perhaps in specific areas where the higher doses are needed and where high bird populations exist, consideration could be given to the requirement of noisemakers or other precautions such as the use of liquid formulations or more specific irrigation practices. Also, the current registered dosage rates for the use of diazinon on these sites should be carefully reviewed to determine whether or not these dosages could be reduced with no loss in efficacy. For certain rarely occurring pests where the dosage rates seem to be high (such as 11 lbs ai/A for millipedes), it may be desirable to go to alternatives to maintain a reduced application rate for diazinon.

Before exercising its regulatory options, EPA may want to pursue with USDA's National Agricultural Pesticide Impact Assessment Program the possibilities of obtaining data to determine the minimum effective dosage rates for controlling these pests in various geographical locations throughout the U.S. At the same time, EPA should consider obtaining additional toxicological data, in cooperation with Ciba-Geigy, to more clearly define the potential hazard to birds, in particular to migrating waterfowl.

The Agency considered USDA's comments on the proposed regulatory decision. Following is a point-by-point response to their comments.

1. The hazard assessment for diazinon was based on the weight of the evidence and not just on a single bird kill. The Agency considered diazinon's acute toxicity, estimated residue levels on grass and seed, estimated dose levels consumed by birds, diazinon application practices, exposure, diazinon residue data, bird kill reports, problems associated with the reporting of bird kills, and the effect on endangered species. No single incident of avian mortality, such as the large kill of Atlantic Brant Geese, is the only basis for the ecological concerns or hazard assessment.

The Agency recognizes that intentional and accidental kills attributed to diazinon may have occurred in some instances or that other pesticides may have been involved as

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well. However, in other [illegible] directions were followed, and diazinon was the only pesticide involved. Certified pesticide applicators and experienced users of pesticides have applied diazinon properly, and bird kills have resulted. Thus, the Agency concluded that diazinon used on golf courses and sod farms will pose a lethal hazard to birds, whether it is applied properly or not.

In addition the Agency still concludes that the 700 Atlantic Brant Goose kill in New York was a result of proper application. The investigation by the State of New York concluded that diazinon was applied according to the label. The State cited the applicator for an infraction regarding licensing according to State law and not misuse (Ref. 20).

2. The Agency has determined that diazinon use poses a significant threat to birds. The Agency believes that the number of bird kills on record do not actually represent the number of kills which have occurred because of problems associated with the reporting of bird kills. Generally bird kills are not noticed and often not reported. The Agency received public comments from State, Federal, and private agencies involved with natural resource management and environmental protection that support the conclusion the bird poisonings, in general, go undetected and are not reported. In many cases predators may have carried the bird carcasses away from the site. In other cases birds may go into brush or cover on the site where they are poisoned and then die. These kills would probably go unnoticed. If the dead birds are found, the observer may not attribute the deaths to a recent insecticide application, and even if a person does suspect that a bird may have been poisoned, the individual may not know to whom to report the incident. Only a few States have personnel trained and equipped to respond to kill reports and to conduct the thorough investigation necessary to determine the pesticide, application rate used, and whether the label directions were followed. The fact that approximately 80 reports are associated with diazinon is strong evidence of repeated and regular hazardous exposure for birds from use of diazinon.

Concerning the lack of bird kills on agricultural sites such as alfalfa and clover, the Agency is concerned about the hazard to birds from diazinon application to these sites as well. As indicated in the Support Document, the data base is inadequate to evaluate the hazard at this time. The Agency will require the data necessary to evaluate fully the hazard through the reregistration process. A Registration Standard on diazinon is scheduled for completion by the end of this year.

3. Based on the weight of the evidence, the Agency has determined it has enough data to assess the avian hazard from diazinon application to golf courses and sod farms. The Agency considered diazinon's acute toxicity, estimated residue levels on grass and seed, estimated dose levels consumed by birds, exposure, diazinon residue data, bird kills, problems associated with the reporting of bird kills, diazinon application practices, and the effect on endangered species. As indicated in the Support Document, only bird kills in which diazinon was clinically diagnosed as the cause of mortality or was strongly implicated were considered.

Among the application practices considered, irrigation and the resulting grass residues were among the factors considered. The Agency determined in the Support Document that residues following application with or without irrigation would result in lethal exposure to birds. The puddles which may form after irrigation may contain diazinon residues and present another hazardous route of exposure.

The Agency realizes that residue data are available on pasture grasses. Fresh grasses have a tolerance of 80 ppm diazinon. However, the registered application rate on pasture grasses is 0.5 lb ai/A, which is less than the current application rate for the major pests on golf courses and sod farms. Direct extrapolation of the resulting residues to residues expected from higher application rates may or may not be reliable.

Instead, the Agency conducted a statistical analysis of measured residues resulting from 2, 4, and 8 lb ai/A to turf grass. This analysis is summarized in Unit II.B and provides statistically significant estimates of average residues expected to result from applications at typical turfgrass rates.

4. The Agency determined in the Support Document that sod farms are ecologically similar to golf courses. The Agency believes that the differences cited by USDA do not outweigh the similarities. Both are areas of lush, well-tended open spaces of grass which are commonly used by birds as forage sites.

EPA disagrees with USDA that the absence of reported bird kills indicates a lack of hazard. Unlike golf courses, sod farms are private businesses and are not subject to the degree of public observation occurring on most golf courses. Therefore, the Agency concluded that even though birds frequent sod farms and are likely to be exposed to lethal residues of diazinon, kills on sod farms are less likely to be observed and reported than are kills on golf courses.

5. The number of turf pests indicated by USDA is conservative. The 1986 Insecticide Product Guide (Ref. 10) lists at least twice the number of turf pests. Many are relatively minor, but under certain circumstances may be important. Diazinon is listed for control of at least 20 of those turf pests. However, other broad spectrum insecticides such as chlorpyrifos and carbaryl are also registered for the control of many of these pests.

Other pesticides are also registered for control of the Bermuda grass mite on golf courses and sod farms, including carbophenothion, dicofol, and ethion.

The inclusion of "fruit fly" among the pests of turf is probably an error and was probably intended to be "frit fly". Frit flies can be serious pests of turf, whereas fruit flies are normally not considered to be. Diazinon is the only pesticide currently registered for control of frit flies.

Cancellation of diazinon on golf courses and sod farms is not expected to affect the control of medically significant arthropods such as the brown dog tick, chiggers, and fleas. These pests are only occasionally found on golf courses and sod farms.

The brown dog tick is not a major vector of Rocky Mountain Spotted Fever in the United States. The American dog tick and the Rocky Mountain wood tick are the principal vectors of Rocky Mountain Spotted Fever in the U.S. (Ref. 5). A number of pesticides are registered for the control of these and other medically important arthropods.

6. USDA indicated that the loss of members from a deme could influence the range of the movement of genes within the associated genotype, but that a change in the residual gene pool would not necessarily result.

Demes are defined as having one or more characteristics that make the members of the deme distinct from other members of the species. Genetic make-up is one of many ways to define a deme (Refs. 4 and 8).

The Agency makes no assertion regarding population viability of any species other than the general comment that genetic variability is important in conferring individual fitness and population survivability.

7. Additional information is needed to understand adequately the assumptions USDA used in calculating its cost analysis. USDA's $2,000,000 estimate of

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the costs from cancellation on golf courses are higher than Agency estimates, but are still minor compared to the maintenance cost of $1,900,000,000 for golf courses. Thus, the analysis does not alter the general conclusions reached in the benefit analysis discussed in the Support Document.

8. In the Support Document and the information submitted to the SAP, the Agency considered a variety of regulatory options including those suggested by USDA, the public, and the registrant. However, the Agency concluded that only cancellation on golf courses and sod farms would reduce the risk to an acceptable level.

C. Public Commments Received in Response to the Special Review

The Agency received 96 public comments on the initiation of Special Review and the proposed cancellation on golf courses and sod farms.

1. Comments Relating to the Avian Hazard

The Agency received 78 comments relating to the avian hazard from diazinon application to golf courses and sod farms. Fifty-seven clearly supported the proposed cancellation, including but not limited to the Fish and Wildlife Service, U.S. Department of the Interior; Canadian Wildlife Service; the States of Indiana, Colorado, New York, Texas, California, New Jersey; environmental groups such as the National Audubon Society, the Natural Resources Defense Council, the National Wildlife Federation, the Rachel Carson Council, the National Coalition Against the Misuse of Pesticides; and pesticide user groups such as ChemLawn Services.

Several businesses representing sod farm interests submitted testimonials in opposition to the proposed cancellation. The substantive comments which were made in the public comments are addressed below.

a. *Cancellation on home lawns.* The majority of the comments which supported the cancellation on golf courses and sod farms proposed that EPA also cancel diazinon use on home lawns and other grassy sites as well.

The Agency responds that the concern over the avian hazard of diazinon application includes the hazard from application on other sites as well. This was discussed in the Support Document. As previously noted, the Agency is reviewing this hazard through the reregistration process.

b. *Problems with reporting.* The Agency received many comments from the public and Federal agencies, and environmental groups concerning problems with reporting of bird kills. Generally bird kills go unnoticed and are not reported. In addition only a few States have personnel trained and equipped to respond to kill reports, should they be reported.

The Agency agrees.

c. *Risk reduction measures.* The Golf Course Superintendents Association of America (GCSAA) and others agreed that diazinon poses a hazard to birds, but argued that diazinon could still be used safely. The Association suggested that diazinon be restricted for use by certified applicators, that the application rates be lowered, and that diazinon be used in conjunction with an integrated pest management (IPM) program.

The Agency responds that the hazard assessment described in the Support Document indicated that diazinon poses a hazard to birds, even when applied according to label directions. Use in conjunction with an IPM program, especially scouting, may reduce the number of diazinon applications. However, diazinon would still be applied and would pose a hazard to birds.

The Agency also considered lowering the application rates as a regulatory option in the Support Document. Based on residue levels estimated in the Support Document (Unit IV.E of the Support Document) and based on residue data submitted during the comment period (Unit III.A of this Federal Register Notice), the Agency still concludes that lowering the application rate would not reduce the risk to an acceptable level.

d. *Tee and green restriction.* Ohio State University proposed diazinon application be limited to tees and greens, if no solution to puddling could be found.

The Agency indicated in the Support Document that puddling cannot always be avoided for several reasons. First, uneven topography leads to runoff and puddle formation. Second, different soils under different conditions absorb water at different rates and puddles may form.

Even if puddling could be avoided, limiting application to tees and greens would not reduce the hazard to an acceptable level. These areas are among the grass areas most favored by grazing birds. They are the most fertilized, watered, and mowed of all grassy areas on golf courses. This intense cultivation of grass makes it especially attractive to grazing birds. Greens, especially the fringe where the grass is one to two inches high, are very attractive to waterfowl and are particularly dangerous (Ref. 7).

Ciba-Geigy Corporation submitted several major points in opposition to the proposed cancellation. These points are addressed as follows:

e. *Rate reduction.* Ciba-Geigy submitted a new study of residues (Ref. 2) on turf, which the company claims shows that application of 4 lb ai/A followed by irrigation reduces the hazard to an acceptable level.

The Agency reviews this study in Unit III and concludes that the data support the Agency's determination that diazinon cannot be safely used on grass at 4 lb ai/A. As also discussed in Unit III, the data also support the conclusion that irrigation does not reduce residues to an acceptable level.

f. *Open literature residue studies.* Ciba-Geigy argued that the Agency did not consider studies by Kuhr and Tashiro (Ref. 6) and Sears and Chapman (Ref. 9), which showed low residues resulting from diazinon application.

The Agency did review these studies and determined that they were not acceptable for use in the Agency's hazard assessment for several reasons (Ref. 18). First, the studies used too small a sample size. Second, application was done by throwing out the granules by hand and watering in with a watering can, which is not the normal method of application. Third, it rained after application and the amount of rain was not quantified.

g. *Erroneous invalidation of 1982 turf studies.* Ciba-Geigy submitted a residue and field dissipation study and a waterfowl study, which the company claims were improperly invalidated by the Agency.

The Agency discussed the many problems associated with these studies in Unit II.A of the Support Document. Both studies failed to use proper study design and sampling methods.

h. *Estimates of residues unreliable.* Ciba-Geigy claims that the Agency's estimates of residues are not reliable and should not be used when actual residue data are available.

The Agency used such estimates in the Support Document because sufficient measured residue data were not available. The Agency recognizes the limitations of these estimates.

During the public comment period the Agency received new experimental data on diazinon residues on grass. These data are analyzed in Unit III and confirm the Agency's conclusions.

i. *Significant population reduction.* Ciba-Geigy claims that the Atlantic Brant Geese killed on May 7, 1984, were from the wintering areas along the Atlantic Coast and not just from the New York population. As a result the 127,300 Atlantic Coast population were not significantly reduced by the loss of

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700, especially considering that 20,000 to 70,000 are killed by hunters annually.

The Agency responds that a kill of 700 birds in a single incident is an important and significant loss. It is within the Agency's mandate to protect birds from unreasonable risk, which the Agency has determined is the case with diazinon's use on golf courses and sod farms.

The U.S. Fish and Wildlife Service (USFWS) of the Department of the Interior supports this conclusion. During the public comment period USFWS commented on the relative impact of diazinon on the management of migratory birds (Ref. 13). USFWS noted that the total kills caused by diazinon, even when considering the problems associated with the reporting of bird kills, may not be large compared with the number killed from hunting. USFWS further commented that the hunting of migratory birds is sanctioned by a number of international treaties and regulated by a highly developed regulatory process. Hunting is legal, conservation-oriented, and recognized as socially beneficial.

The poisoning of waterfowl and other birds, however, is not legally sanctioned and has no redeeming social value. USFWS indicated that the unplanned killing of migratory birds should be corrected. Thus, the USFWS supports the Agency's determination to cancel the use of diazinon on golf courses and sod farms.

j. *Label amendments.* Ciba-Geigy applied to amend their labels to reduce the hazard to birds. These amendments included a seasonal Nassau County restriction, a lower application rate of 4 lb ai/ A followed by irrigation, and additional avian hazard warning statements. Ciba-Geigy also proposed an extensive education program to promote the proper use of diazinon to reduce the risk to birds.

The Agency evaluated the label amendments in the Support Document and determined that lowering the application rate, adding seasonal or geographic restrictions, and adding precautionary labeling would not adequately protect birds. In addition an education program would also not protect birds because diazinon when properly applied still results in unacceptable exposure to birds.

k. *Bird kills.* Ciba-Geigy submitted an investigation (Ref. 3) of the bird kills reported in the Support Document. The investigation contains interviews with golf course and State personnel. Much of the report contains summaries of information from the Agency's files: maps and pictures of the kill sites; photocopies of portions of Agency documents, published literature, and laboratory reports. The report also contains new information, which is largely comprised of the phone and personal interviews with golf course personnel. In some cases the personnel interviewed were not employed at the golf course at the time of the kills, but recounted stories and gave opinions regarding the circumstances surrounding a particular bird kill. The investigators concluded that accidental or deliberate misuse of diazinon caused all of the bird kills.

Although the Agency is always concerned about the misuse of any pesticide, the Agency is not persuaded that this anecdotal information establishes that diazinon was misused in all of these circumstances. Other investigative reports conducted by State and local agencies contradict Ciba-Geigy's conclusions, and Agency records indicate bird kills resulting from proper application. Pesticide users on golf courses are generally trained or are certified pesticide applicators and are expected to follow label directions. However, bird kills have still resulted.

The kill reports along with the other information presented in the Support Document and in this Notice are part of the weight of evidence which support the conclusion that the use of diazinon on golf courses and sod farms poses a hazard to birds.

2. Comments Relating to the Benefits of Diazinon on Golf Courses and Sod Farms

The Agency received 25 comments relating to the benefits of diazinon use on golf courses and sod farms. The major points and the Agency's responses are discussed below.

a. *Lack of viable alternatives.* Several comments indicated that the alternatives either do not work or do not work as well. Also, some of the alternatives are erratic in their performance and are not as reliable.

The Agency responds that based on efficacy data reviewed in Unit III, no statistically significant difference was detected between diazinon and the five other principal pesticides in controlling most of the major turf pests. The Agency agrees that diazinon may work better than its alternatives in certain cases, but in general the Agency believes that the alternatives work as well.

b. *Efficacy of lower application rates.* Several comments expressed concern that diazinon would not work as effectively at 4 lb ai/A, 2 lb ai/A, or any application rate lower than present label application rates.

In Unit III the Agency reviews efficacy data submitted during the comment period. On the basis of the data no significant difference in the control of most major pests was evident at application rates as low as 4 lb ai/A.

c. *Efficacy of irrigation.* Several comments questioned diazinon's efficacy after irrigation.

The Agency responds that Ciba-Geigy Corporation labels already recommend thorough watering for most pests. However, the labels are not clear for certain pests and recommend against watering for others such as frit flies. Watering in would reduce the efficacy of diazinon for those pests that live and/ or feed on the foliage and upper stems of the grass such as aphids, mites, ticks, frit flies, etc. For major turf pests (white grubs, sod webworm, chinch bug, mole cricket, billbugs, and European crane fly), the practice of watering in would probably enhance the efficacy of diazinon. Those pests for which watering in would reduce diazinon's efficacy (the top feeders) are relatively minor pests of turf.

d. *Non-chemical means of control.* New York State Department of Environmental Conservation, the Susquehanna Sierra Club, and others commented that there are alternative, non-chemical methods of control, which the Support Document did not address.

The Agency recognizes that considerable research is being conducted on non-chemical means of turf pest control, as indicated in Unit III.B of the Support Document. The Agency concentrated on evaluating the risks posed by alternative chemicals because they are the most likely substitutes on golf courses and sod farms if diazinon is removed from the market.

e. *Billbug control.* The University of Idaho and Washington State University were concerned about billbug control in their States. The University of Idaho indicated that they anticipate an increase in billbug damage to golf courses and sod farms, if diazinon is not available for use on these two sites. However, they were not able to quantify the impact because of the lack of data. Washington State University (WSU) submitted a report based on a 1984 field test, which they claimed demonstrated that diazinon was significantly more effective for billbug control than its major alternatives.

The Agency reviewed the data submitted by WSU. Although the test was reasonably well designed, it was a single test in one locality and involved low population levels of billbugs. Because the test was limited in sample size, limited geographically, and failed to test a worst-case situation, the

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Agency concluded that the data are not adequate to demonstrate that diazinon is the most effective insecticide available for billbug control.

f. *Economic value of wildlife.* The State of Indiana, the Adirondack Park Agency, and others indicated that wildlife resources are extremely valuable and that the cost-benefit analysis did not consider the value of wildlife. The analysis was based on the impact of users shifting to alternative insect control measures.

The Agency agrees that wildlife resources such as birds are extremely valuable. However, the Agency did not estimate their value in terms of economic values for two reasons. First, such an analysis would be limited to the reported bird deaths from diazinon, which may significantly underestimate the number of actual deaths. Second, dollar values are available only on game species and do not include all species of concern. As a result an economic assessment of the loss of birds due to diazinon poisoning on golf courses and sod farms would greatly underestimate any economic value, unless many assumptions were made.

In addition such an assessment would not include the subjective value of wildlife. Many citizens enjoy watching birds or just simply enjoy the knowledge that they are there. Any economic assessment, would be a crude indicator of the overall value of wildlife.

g. *Economic impact on individual golfers.* University of Massachusetts questioned the derivation of the 7 cents per golfer.

The estimated impact of 7 cents per golfer is based on the total national impact for all golf courses and the total number of golfers in the United States. The impact on an individual golfer may be different, depending upon the location of the course, the extent of the use of diazinon, and the alternative control methods applied after diazinon's cancellation.

h. *Diazinon's cost.* The Cornbelt Chemical Company and Ciba-Geigy Corporation indicated that diazinon is one of the least costly products for turf insect control, if application rates are considered.

Ciba-Geigy quoted prices per pound for diazinon and its alternatives which are identical to prices used by EPA in the benefit analysis. Their average application rates were fairly consistent with EPA estimates, with the exception of chlorpyrifos. Ciba-Geigy's estimate was approximately 50 percent over the reported rate estimated from the golf course survey discussed in the Support Document and is significantly higher than minimum label application rates.

The Agency's economic analysis of the impacts on golf courses was more detailed than Ciba-Geigy's analysis. The Agency estimated cost per acre for five of the top pest problems and calculated a weighted average cost per acre by region, depending on The pest problems found on golf courses in that area. The Agency's and Ciba-Geigy's conclusions regarding the differential cost per acre were not significantly different.

i. *Sod farm analysis.* The American Sod Producer's Association commented that the cost implications to sod farms were grossly miscalculated, but provided no details to support the comment. They also indicated that there is no evidence in the Support Document accounting for regional differences among sod producers.

The benefit analysis for sod farms did consider regional differences for percent of sod treated with diazinon and value of sod produced. Regional impacts were recognized and discussed in the analysis in Unit III.D of the Support Document.

3. Comments Relating to Other Issues

The Agency also received comments on issues not directly related to the avian hazard.

a. *Sulfotepp.* The Susquehanna Group Sierra Club commented that diazinon formulations contain sulfotepp as a major impurity. They indicated that sulfotepp is 30 to 120 times more toxic than diazinon and considerably more stable.

EPA is aware of the sulfotepp impurity in diazinon. Information on the levels of sulfotepp in diazinon products, and analytical methods to detect the sulfotepp impurities will be required as part of the reregistration process.

b. *Hazard to humans and pets.* The Agency received several comments relating to the potential hazards to humans and pets from the use of diazinon on golf courses, sod farms, and other sites from potential water contamination. As indicated, the Agency will be conducting an intensive review of the toxicology data base and the potential for water contamination for diazinon through the reregistration process.

V. Initiation of Regulatory Actions

This Unit has several sections. The first summarizes EPA's reasons for concluding that products that contain the active ingredient diazinon and that are registered for use on golf courses and sod farms should be cancelled. The second section defines the terms used in this unit. The third section specifies the conditions of registration that are required for federally registered products to remain registered. The fourth section establishes provisions concerning the sale, distribution, and use of existing stocks.

A. Agency's Conclusions

Based on the Agency's analysis in the Support Document and the information reviewed after the Notice of Special Review and Preliminary Notice of Intent to Cancel was issued, the Agency concluded that the risk to birds outweighs the benefits of use of diazinon products on golf courses and sod farms and that unreasonable adverse effects to birds will occur. In evaluating the hazard, the Agency considered diazinon's acute toxicity, estimated residue levels on grass and seed, estimated dose levels consumed by birds, diazinon application practices, exposure, diazinon residue data, bird kills, problems associated with the reporting of bird kills, and the effect on endangered species. In evaluating the benefits the Agency considered the biology of the insect pests, their control, the user cost impact of cancellation, and the efficacy of diazinon and its major alternatives.

The Agency also considered numerous restrictions as alternatives to cancellation and concluded that even with restrictions such as reduced application rates, additional hazard warnings, geographic and seasonal restrictions, and others, diazinon would still result in hazardous exposure to birds.

The weight of the evidence leads the Agency to conclude that the risk to birds outweighs the minor benefits and that cancellation is the only appropriate action.

B. Definitions

The following terms are defined for the purposes of this Unit.

1. "Manufacturer" refers to any registrant who, as defined, sells or distributes an end-use product containing diazinon registered for use on golf courses and sod farms.

2. "Existing stocks" refers to any quantity of diazinon products registered for use on golf courses and sod farms and which are in the United States on the date of publication of this Notice and which are formulated as an end-use product.

3. "Distribute and sell" and grammatical variants refer to the distribution, sale, offering for sale, holding for sale, shipping, delivering for shipment, or receiving and (having so received) delivering or offering to deliver a pesticide product.

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C. Requirements for Complying With This Notice

A manufacturer of any product containing diazinon which is registered for use on golf courses and sod farms must submit an application to amend the registration of the product within 30 days of publication in the Federal Register or receipt of this Notice, whichever is later, to be allowed to continue to sell and distribute the product. The application must propose to amend the registration of the product to include the following statement on top of the front panel of the label or have supplemental labeling:

This product must not be used on golf courses and sod farms.

D. Existing Stocks

The following paragraphs describe the conditions under which registrants and others may sell and distribute existing stocks of diazinon registered for golf courses and sod farms. Existing stocks may not be sold and distributed except as provided below.

1. No manufacturer may release for shipment after November 30, 1986, any diazinon product unless the product bears an amended label or has supplemental labeling affixed which complies with Unit V.C.

2. No diazinon product may be distributed or sold by a retailer or other person after April 30, 1987, unless the product bears an amended label or has supplemental labeling affixed which complies with Unit V.C.

The Agency has determined that this existing stock provision is consistent with the Act. The majority of the use season will have ended by this fall, and as a result, the Agency does not anticipate that much diazinon registered for use on golf courses and sod farms will be distributed during the period of time until November 30, 1986. These products will be quickly distributed through commerce until April 30, 1987. The Agency believes that this is the quickest and most effective way to proceed with existing stocks.

VI. Procedural Matters

This Notice announces EPA's intent to cancel the registrations of products that contain diazinon and that are registered for use on golf courses and sod farms. This Unit explains how current registrants may apply to amend their registrations to comply with the terms and conditions discussed in Unit V.

Under sections 6(b) and 3(c)(6) of FIFRA, applicants, registrants, and certain other adversely affected persons are also entitled to respond to this Notice by requesting a hearing on the actions that EPA is initiating. Unless a hearing is properly requested with regard to a particular registration or application, this action will become final by operation of law.

This unit of the Notice explains how such persons may request a hearing on EPA's final cancellation and denial Notice (and the consequences of requesting a hearing and failing to request a hearing in accordance with those procedures).

A. Procedure for Amending the Terms and Conditions of Registration To Avoid Cancellation or Denial of Application

Registrants affected by the cancellation actions set forth in this Notice may avoid cancellation by filing for an application for an amended registration which contains the label modifications detailed in Unit V.B of this Notice. This application must be filed within 30 days of receipt of this Notice or within 30 days from the publication of this Notice, whichever occurs later. Applicants for a registration subject to this Notice must file an amended application for registration within the applicable 30-day period to avoid denial of their pending application.

Applications must be submitted to:

George LaRocca, Product Manager 15, Registration Division (TS-767C), Office of Pesticide Programs, Environmental Protection Agency, 401 M St., SW., Washington, DC 20460, (703-557-2400).

B. Procedures for Requesting a Hearing

To contest the cancellation action set forth in this Notice, Federal registrants or applicants may request a hearing within 30 days of receipt of this Notice, or within 30 days from publication of this Notice, whichever occurs later. Any other person adversely affected by the action described in this Notice may request a hearing within 30 days of publication of this Notice in the Federal Register.

A registrant or other adversely affected party who requests a hearing must file the request in accordance with the procedures established by FIFRA and EPA's Rules of Practice Governing Hearings under 40 CFR Part 164. These procedures require, among other things, that all requests must identify the specific pesticide product(s) for which a hearing is requested, and that all requests must be received by the Hearing Clerk within the applicable 30-day period. Failure to comply with these requirements will result in denial of the request for a hearing. Requests for a hearing should also be accompanied by objections that are specific for each use of each pesticide product(s) for which a hearing is requested.

Requests for a hearing must be submitted to:

Hearing Clerk (A-101), Environmental Protection Agency, 401 M St., SW., Washington, DC 20460.

1. Consequences of Filing a Timely and Effective Hearing Request

If a hearing on the action initiated by this Notice is requested in a timely and effective manner, the hearing will be governed by EPA's Rules of Practice for hearings under FIFRA section 6 (40 CFR Part 164), as modified below. The hearing will be limited to the specific uses and specific product registrations for which the hearing is requested.

In the event of a hearing, the specific use or uses of the specific registered product which is the subject of the hearing will not be cancelled except pursuant to an order of the Administrator at the conclusion of the hearing. If the product is not cancelled at the conclusion of the hearing, the dates affecting release for shipment, sale, and distribution may be modified for products not relabeled in accordance with this Notice.

2. Consequences of Failure To File in a Timely and Effective Manner

If a hearing concerning the registration of a specific pesticide product subject to this Notice is not requested by the end of the applicable 30-day period, registration of that product will be cancelled, unless the registrant files a request for an amended registration within the statutory period provided herein (see Unit V).

If the registration of a product covered by this Notice is cancelled by operation of law, the sale and distribution of existing stocks is governed by the provisions of Unit V of this Notice.

C. Separation of Functions

EPA's Rules of Practice forbid anyone who may take part in deciding this case, at any stage of the proceeding, from discussing the merits of the proceeding *ex parte* with any party or with any person who has been connected with the preparation or presentation of the proceeding as an advocate or in any investigative or expert capacity, or with any of their representatives (40 CFR 164.7).

Accordingly, the following EPA offices, and the staffs thereof, are designated as the judicial staff to perform the judicial function of EPA in any administrative hearing on this Notice of Intent to Cancel: The Office of the Administrative Law Judge, the

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Office of the Judicial Officer, the Administrator, the Deputy Administrator, and the members of the staff in the immediate office of the Administrator and Deputy Administrator. None of the persons designated as the judicial staff may have any *ex parte* communication with the trial staff or any other interested person not employed by EPA on the merits of any of the issues involved in this proceeding, without fully complying with the applicable regulations.

D. Schedule

EPA believes that it would be in the public interest to reach a prompt, final decision in this matter, and accordingly is establishing a deadline for the issuance of an Initial Decision by the Administrative Law Judge (ALJ) in the event that a hearing is requested. The ALJ assigned to any adjudicatory hearing requested on the action initiated by this Notice shall issue an Initial Decision no later than 9 months from the date on which this Notice is published in the Federal Register. Review of any exceptions to the Initial Decision will follow the schedule provided in 40 CFR 164.101, and a Final Decision will be issued as soon as possible thereafter.

As explained earlier in this Notice, the use of diazinon on golf courses and sod farms poses a significant risk to nontarget bird species, and in fact such use may be killing substantial numbers of birds. A thorough, but prompt, examination of these risks and the associated benefits is in the public interest.

In view of the limited scope of the issues and their relatively straightforward nature, EPA believes that 9 months should give the participants ample time to conduct discovery, to present evidence, to conduct cross-examination, and to prepare briefs for the ALJ and for the ALJ to prepare and issue an Initial Decision. This schedule reflects the fact that only one kind of risk, hazard to birds, is at issue and that the proposed cancellation involves only two use sites. The schedule also reflects the fact that a considerable body of information and analysis has been assembled during the Special Review of diazinon.

Any party may by motion request that the deadline be extended. If it appears to the ALJ that additional time will be needed, the ALJ shall promptly inform the Judicial Officer of the circumstances which contribute to the need for more time and shall propose a schedule for completing the hearing, together with a new deadline for issuance of the Initial Decision. The Judicial Officer is given authority to establish a new schedule.

If an appeal from the Initial Decision is taken, it is expected that a final decision would be issued within 60 days.

VII. References

The references used in this Federal Register Notice are as follows:

(1) Ciba-Geigy Corporation, Agricultural Division. "Efficacy of Diazinon on Grubs and Chinch Bugs vs. Other Registered Insecticides." Submitted to the Agency October 18, 1985. Accession No. 260218.

(2) Ciba-Geigy Corporation. "Response of Ciba-Geigy Corporation to the Special Review and Proposed Cancellation of Diazinon." Public Docket No. D-05113, submitted to the Agency March 28, 1986. Accession No. 262153.

(3) Ciba-Geigy Corporation. "Reinvestigations of Bird Kills Associated With The Use of Diazinon on Turf Grass (Bio-Life Associates)." Volumes 1 and 2. Accession No. 263011 and 263012.

(4) Futuyma, D., 1979. Evolutionary Biology. Sinauer Associates, Inc., Cambridge, Massachusetts.

(5) Harwood, R.F. and M.T. James, 1979. Entomology in Human and Animal Health. 7th Edition. Macmillan Publishing Company, New York, New York.

(6) Kuhr, R.J. and H. Tashiro. "Distribution and Persistence of Chlorpyrifos and Diazinon Applied to Turf." Bulletin of Environmental Contamination and Toxicology 20, pp. 652-656, 1978.

(7) Littrell, E.E. "Mortality of American Wigeon on a Golf Course Treated with the Organophosphate Diazinon." California Fish and Game 72, pp. 12-14, 1986.

(8) Mayr, E., Animal Species and Evolution, 1963. Harvard University Press, Cambridge, Massachusetts.

(9) Sears, M. and R.A. Chapman. "Persistence and Movement of Four Insecticides Applied to Turfgrass." Journal of Economic Entomology 72, pp. 272-274, 1979.

(10) Stine, Charlotte, 1986. Insecticide Product Guide 1986. Ag Consultant and Fieldman, Volume 2.

(11) Sorenaen, K.A., ed. "Insecticide and Acaricide Tests" 1981. Volume 6. Entomological Society of America, 1981.

(12) United States Department of the Interior, 1986. "Formal Section 7 Consultation on the Registration of Products Containing Diazinon For Use on Golf Courses and Sod Farms." Memorandum from Stephen W. Perry.

(13) United States Department of the Interior, 1986. "Review and Preliminary Determination To Cancel Registration of Diazinon." Memorandum from E. Lamberton.

(14) United States Environmental Protection Agency, 1986. "Analysis of Residue Data Submitted by Ciba-Geigy During Special Review of Diazinon." Memorandum from Margaret Rostker.

(15) United States Environmental Protection Agency, 1986. "Benefits/Entomological Information for the PD-4 Document on Diazinon Uses on Golf Courses and Sod Farms." Memorandum from John Kliewer.

(16) United States Environmental Protection Agency, 1986. "Bird Kills Associated With Diazinon and Reported to EEB Since Initiation of Special Review." Memorandum from Margaret Rostker.

(17) United States Environmental Protection Agency, 1986. "Diazinon Support Document." December 1985.

(18) United States Environmental Protection Agency, 1986. "EEB Review of Two Open Literature Studies." Memorandum from Margaret Rostker.

(19) United States Environmental Protection Agency, 1986. "Information Concerning Diazinon for the Scientific Advisory Panel." April 28, 1986.

(20) United States Environmental Protection Agency, 1986. "Transcript of Proceedings: United States Environmental Protection Agency, Scientific Advisory Panel, Open Meeting," May 21, 1986.

(21) York, A.C., ed. "Insecticide and Acaricide Tests." Volume 7. Entomological Society of America, 1982.

(22) York, A.C., ed. "Insecticide and Acaricide Tests." Volume 8. Entomological Society of America, 1983.

(23) York, A.C., ed. "Insecticide and Acaricide Tests." Volume 9. Entomological Society of America, 1984.

(24) York, A.C., ed. "Insecticide and Acaricide Tests." Volume 10. Entomological Society of America, 1985.

All but the published references are available for inspection in Rm. 236, Crystal Mall Building #2, 1921 Jefferson Davis Highway, Arlington, Va., from 9 a.m. to 4 p.m., Monday through Friday, excluding legal holidays.

Dated: September 24, 1986.

Lee M. Thomas,

Administrator.

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